DEPOSITION OF NICKEL-ION COATINGS USING MORPHOLINE BORANE AS A REDUCING AGENT

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In this study we investigate the deposition conditions of nickel-iron (NiFe) binary alloy coatings using low-cost and straightforward electroless metal deposition with morpholine borane (MB) as a reducing agent. The effect of Fe^{2+} concentration on the morphology, structure, and composition of the NiFe binary alloy coatings has been investigated. The plating solution consisted of 0.14 M nickel sulfate, 0.05 M ethylenediaminetetraacetic acid, 0.1 M sodium malonate, 0.2 M glycine, 0.2 M morpholine borane, and different concentrations of iron sulfate (0.5 mM, 1 mM, 5 mM, and 10 mM). The plating bath operated at a temperature of 60 ^{o}C. The morphology, structure and composition of the obtained NiFe binary alloys have been characterized by Scanning Electron Microscopy, Energy Dispersive X-ray Analysis, X-ray diffraction, and Inductively Coupled Plasma Optical Emission Spectroscopy. It was found that $Ni_{90}Fe_{10}$, $Ni_{80}Fe_{20}$, $Ni_{60}Fe_{40}$, and $Ni_{30}Fe_{70}$ coatings were deposited on copper surface than the concentration of Fe^{2+} in the plating solution was 0.5 mM, 1 mM, 5 mM, and 10 mM, respectively. The deposition rate for the $Ni_{90}Fe_{10}$, $Ni_{80}Fe_{20}$, $Ni_{60}Fe_{40}$, and $Ni_{30}Fe_{70}$ coatings was approximately 2.6, 3.6, 1.1, and 1.4 mg cm^{-2} h^{-1}, respectively.

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